SIX SIGMA PRACTICES:
A STUDY OF LG POLYMERS, VISAKHAPATNAM

Synopsis of the thesis submitted for the award of the Degree of

DOCTOR OF PHILOSOPHY

in the Faculty of Commerce and Management Studies

Andhra University, Visakhapatnam

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2013

SYNOPSIS

Quality management is the main focus of several organizations in the globalized era. National and institutional systems for evaluation, assessment, accreditation and audit are now routine aspects in the majority of European countries. However, this does not mean that quality work and quality improvement are integrated parts of the sector. Available evidence rather suggests that while systems, procedures and rules are being laid down, creating much data, many reports and much attention , there is still a lack of active involvement of Staff and Management in these processes. While quality culture has a taken-for-granted meaning attached to it, it is not really helpful to those who want to improve the link between quality work and the fundamental processes of teaching and learning. The problem related to a poor understanding of the concept of quality culture is that it opens up for processes more dominated by belief, faith and ideology than processes more characterized by knowledge, analyses and empirical studies of the elements that are important for a better description and understanding of such a culture.

Culture, as stated by Williams, 'is one of the two or three most complicated words in English language'. The complications arise because the concept has evolved differently in different European languages and in different disciplines. The word is derived from the Latin 'colere', which had various meanings, including cultivate, protect, inhabit and honour with worship. Some of these meanings dropped away although they remain linked through derived nouns such as cult, for honour with worship and colony for inhabit. The Latin noun 'cultura' evolved and its main meaning was cultivation in the sense of husbandry. Much later, after it passed into English early in 15th century it also meant "cultivation of the mind".

So culture moved away from the notion of husbandry, although never abandoning it: the culture in which laboratory specimens are grown and, of course, attempts to create or grow a culture [of quality]. Culture, in the

sense of a system of shared beliefs, values, customs, behaviours, and artifacts, developed along three lines. First, culture is used as an abstract noun implying civilized. Second, culture implies artistic culture, which was initially 'high' culture but has also developed to mean any form of artistic endeavor, including the subset of 'popular culture'. This artistic construction, at its broadest, refers to all aspects of human achievement that are recorded in some kind of documentary form, including, painting, sculpture, literature, film, photographs and video. Third is the notion of diverse cultures (including subcultures), which linked culture firmly with a way of life. This democratic view includes everything that is part of a society or indicative of a class or other group. Thus, culture, in this version, is closely associated with the idea of society. The third democratic view is, furthermore, conducive to a cultural relativist perspective. The core thesis of cultural relativism is that there are no absolute standards of human cognition. Different cultures have different standards. The implication of this is that social, political, ethical or indeed any cultural phenomena should be considered against the prevailing standards of the particular culture in which they occur. Similarly, no judgments can be made that the institutions of one culture are superior or inferior to those of another culture. Cultural relativism denies the legitimacy of cross-cultural evaluations. Indeed, knowledge, notions of truth and moral imperatives are relative to cultures and subcultures.

Interest in and analysis of cultural theory continued with studies in the 1980s further exploring the critical reaction to the dominant position of rational theories of the 1970's. In essence, those advocating a cultural perspective for understanding social and organizational behavior reacted against the functionalist neglect of how rationalist meaning is constructed in modern societies. During the 1980s, those advocating the cultural approach to organizations could be divided into two basic camps. On the one side, those seeing culture as something an organization has, i.e. culture as a potentially identifiable and manipulative factor, and those seeing culture as something an organization is, i.e. culture as an integrated product of social

interaction and organizational life that is impossible to differentiate from other factors. In the latter version, culture has been viewed as an integrated dimension of (most often) sociological and anthropological research into social behavior. In the former version, it emphasized as the new organizational instrument by reformers, consultants and management gurus; sometimes because they simply had 'run out of specifics'. Culture became an umbrella term for all possible intangible factors in organizational life.

During the 1980s, it was this perspective that dominated business and industry and received considerable attention in private companies. The emerging interest in quality during the 1980s can be related to this perspective. The success of Japanese business after World-War II has been related by a number of authors to cultural factors and how these positively affect organizations and organizational behavior. One of the central ideas of the quality movement, continuous improvement or kaizen, is very much intertwined with what management gurus wrote about culture at that time. Hence, rather than understanding culture and quality as independent entities, it is important to understand that quality actually stems from a broader cultural perspective. Quality initiatives began to develop in the early 1930s. Walter Shewhart made a significant contribution to the philosophy of quality improvement with his book "Economic Control of Quality of Manufactured Products". Shewhart with a stroke of a pen developed the control chart, which relied on probability and statistical theory to define common-cause and special-cause variation of manufactured products. Shewhart's work provided the statistical basis for many quality improvement initiatives of the 20th century.

Shewhart's quality improvement philosophy represented a significant departure from the Scientific Management manufacturing philosophy of the 1930s and earlier. Even though Shewhart's views were being practiced within Bell Laboratories, most manufacturers of this era adopted the ideas and concepts of Scientific Management promoted by Frederick Taylor. Taylor

is associated with the extreme division of labor and with using time and motion studies to turn people into mindless automatons (Hayes, 1988). Many feel that Taylorism led to the birth of managers and collective bargaining. Scientific Management had four basic principles:

- Find the most efficient way to do a job
- Match people to tasks
- Supervise, reward and punish and
- Use staff to plan and control

Controlling and reducing variation in manufacturing reduces defective products and rework. Shewhart's philosophy as related to the control chart identifies and quantifies process and product variation. By collecting time ordered data the process can be constantly monitored. The Shewhart control chart defines variation as being either common-cause variation (natural system variation) or special-cause variation. Shewhart defined common-cause variation as variation that is inherent to the manufacturing system. Common-cause variation is caused by day-to-day machinery variation, operator-to-operator variation, supplier variation. Shewhart defined special-cause variation as variation that occurs from an event in the manufacturing process. The event may be due to downtime, start-up, a new supplier, motor-stop, tool-wear. Shewhart observed that variation due to common-causes exhibited a symmetric or normal distribution whereas variation due to special-causes goes beyond natural variation and does not follow typical statistical laws.

Even though W.E. Deming studied under W.A. Shewhart and was shunned by the U.S. automotive industry in the 1950s, he is considered by many to be the father of the "American Quality Revolution." In America, Deming became well known in 1984 after a prime-time NBC television broadcast titled, "If Japan can, why can't we?" The television broadcast highlighted Japan's international business success in the 1970s and 1980s against the backdrop of a struggling U.S. economy and a U.S. automotive industry that was closing plants due to a loss of 25% market share due to

Japanese competition.. The television broadcast highlighted Deming's work with the Japanese in the 1950s and 1960s and many feel the television broadcast was the start of the American Quality Revolution of the 1980.

Deming emphasized the importance of statistical thinking in the continuous improvement of processes. He felt that Statistical Process Control (SPC) and Shewhart's Plan-Do-Check-Act (PDCA) cycle were important tools to understanding sources of variability and improving processes. The continuous improvement philosophies of Deming were best communicated in his Fourteen Points for Management. His Fourteen Points served as a framework for quality and productivity improvement. Those are given below:

- Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
- Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
- Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
- End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.
- Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
- Institute training on the job.
- Drive out fear, so that everyone may work effectively for the company
- Institute leadership. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of

management is in need of overhaul, as well as supervision of production workers.

- Institute a vigorous programme of education and self-improvement.
- Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production in use that may be encountered with product or service.
- Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.
    - Eliminate work standards (quotas) on the factory floor. Substitute leadership.
    - Eliminate management by objective. Eliminate management by numbers, numerical goals.
- Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.
- Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means abolishment of the annual or merit rating and of management by objective.
- Put everybody in the company to work to accomplish transformation. Transformation is everybody's job.

Deming believed that one of the “great evils” of American management was to produce products or services to a “quality standard” or an “acceptable-level” of quality. He felt that “quality standards” did not promote continuous improvement. He believed that “quality standards” produced numerical quotas, which were often met “on paper” in the quarterly report but rarely could be verified on the plant floor.

Need for the study

Six Sigma as a powerful business strategy which has been well recognised as an imperative for achieving and sustaining operational and service excellence. While the original focus of Six Sigma was on manufacturing, today it has been widely accepted in both service and transactional processes. It is also a measure of quality that strives for near elimination of defects using the application of statistical methods. In Six Sigma, a defect is defined as any process output that does not meet customer specifications, or that could lead to creating an output that does not meet customer specifications.

One key innovation of Six Sigma involves the "professionalizing" of quality management functions. Six Sigma utilises the concept of statistical thinking and encourages the application of well-proven statistical tools and techniques for defect reduction through process variability reduction methods. Prior to Six Sigma, quality management in practice was largely relegated to the production floor and to statisticians in a separate quality department. For global competitiveness, Indian industries have been striving to achieve overall operational excellence in their businesses. To respond to the fast changing economic conditions and customer needs, various industrial engineering and quality management strategies such as ISO 9000, TQM, KAIZEN, Just in Time (JIT) manufacturing, Enterprises Resources Planning (ERP), Lean Management, Business Process Reengineering (BPR) have been developed. A new paradigm in this area of manufacturing strategies is Six Sigma.

As per the literature review the Six Sigma practices in various organisations are very limited. LG polymers India Pvt. Ltd. is committed to customer satisfaction. To foster the same LG Started improving the quality instead of increasing the price to meet the market competition by using one of the quality initiatives like Six Sigma. So far there has been no study conducted on Six sigma in LG Polymers, Visakhapatnam. Therefore, the present study is undertaken to bridge the gap in the research area.

Objectives of the study

a. To examine the six sigma tools and techniques
b. To review research and literature
c. To study the project implementation and advantages of six sigma.
d. To analyse the perceptions of employees in implementation process of six sigma.
e. The ultimate objective is to offer suggestions for effective implementation of Six Sigma in LG polymers

Methodology

The study is based on primary and secondary sources of data. The population consists of 300 employees of LG polymers in Visakhapatnam. Primary data has been collected from 150 employees based on simple random sampling technique. While preparing the sample design, the nature of the work of the employees and position in the departments where they are working is considered as the basis. They are namely Mangers, Assistant Managers, Engineers, Officers and Chemists from the departments commercial (QAD, QI&S, F&A, EDP, M&I, IR&HR and Safety), Engineering (engineering, Innovative and process engineering) and Production (GPPS, HIPS, EPS).

The researcher, on completion of the pilot study has collected the required data using questionnaire, interview and observation methods. One comprehensive questionnaire has been designed for the purpose of the study, which forms the third important source of data collection. The questionnaire contains in all about 39 items including the items eliciting the personal information of the respondents. Out of 39 items, 9 items are related to personnel information and the remaining 30 items related to Six Sigma practices.

Similarly, the questionnaire has been originally administered to a small sample of 30 respondents for the pilot study. Later the questionnaire

has been finalized and date collected from 150 employees pertaining to the above stated departments

The major sources of secondary data are books, journals reports and records of LG polymers, various published and unpublished sources have been used to collect data. The researcher visited the Academic Staff College of India, Institute of Public Enterprise, Indian School of Business, National Productivity Council, All India Management Association and various libraries in Hyderabad, New Delhi and Visakhapatnam, for the collection of secondary data. Some papers from websites also have been collected.

An attempt has been made to analyze and understand the perceptions of the sample respondents about Six sigma Practices in LGPI. The data were fed to the computer. The tabulations and the results for analysis were done with the help of SPSS (Statistical Package for Social Sciences) version 16, MINITAB version-15 and Microsoft Excel-2007 for Statistical measurements such as simple percentages, mean values

Presentation of the study:

This study has been presented in Six chapters. Chapter–I deals with the introduction to quality and six sigma concepts. The need, objectives, methodology and presentation of the study, limitations are covered. Chapter–II presents the review of literature, which covers the collection of studies on six sigma implementation and process across the world. Chapter–III presents the conceptual frame work of the study which gives an overview about Six Sigma in the selected area. Chapter–IV presents the profile of polymers industry and also the profile of LG Polymers Visakhapatnam. Chapter – V Analyses the responses of the executives on various aspects of Six Sigma. Chapter – VI presents the summary and suggestions of the study.

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